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**Impact of Sustainable Intensification on Landscapes and Livelihoods**

**Modeling Workshop Summary Report**

**Chisamba, Zambia**

**August 13-14, 2014**

# Workshop objectives

1. Introduce the landscape module and get participant feedback on model assumptions and structure
2. Use the landscape module to run scenarios for testing policies and interventions and examining future paradigm shifts
3. Identify feedbacks between the landscape module, wildlife module, and household module
4. Receive participant feedback on the structure of the wildlife and household modules.

# Small group discussions on landscape model

This section includes an outline of feedback from the participants about the following questions:

1. What about the model’s behavior surprises you, if anything? Why?
2. Which of the model outcomes represented here (for the baseline run) are desired or undesired?
3. If undesired, what are some interventions that are disrupting/could disrupt the model behavior?
4. What are the assumptions underlying the operation of the model (please refer to the model guide)? Under what circumstances would those assumptions be invalidated?
5. What are some scenarios *outside of your/your organization’s control* which would change the operation of the model *(examples might include political disruption, drought, economic downturn, etc.)*

The interventions discussed by participants focused on three broad categories: more efficient energy sources (or more energy efficient cook stoves), energy governance (such as legalization and enforcement of charcoal), and social programs targeting fuelwood consumption such as community based NRM. Scenarios to explore ranged from human-environment conflict (climate change and carbon sequestration) to exogenous market scenarios (food price spikes, increase in value of tourism) to development led scenarios (land grabbing by foreign entities and road building). Some additional landscape level topics that arose were the prevalence of fire in grassland areas, illegal logging in Eastern Province, gender dimensions of fuelwood harvesting, and the contribution of migration and land access to extensification. Deforestation and agricultural expansion are topics to explore with remotes sensing data as well as land use changes in Miombo woodland. UN REDD+ portal for Zambia and the landscape portal are two more sources of data identified relevant to the landscape level model.

In addition to looking at some of the interventions and scenarios above we will make changes to the landscape model based on disaggregation of forest and land cover types (and looking at biomass, regeneration, and abandonment rates). Based on this we will use spatial data to look at preferences for expanding into different land types. We will also explore the extent of extensification due to migration and emergent farmers. We will also look closer at energy self-sufficiency at the household level particularly in terms of agroforestry species (preferences and rates of tree growth from specific agroforestry interventions on farm). We will also consider the effects of fire on the landscape. Climate change was identified as an area where further literature review is needed with a likely focus on greenhouse gas emissions as opposed to carbon stocks.

# GIS/Remote sensing

John Boos briefly presented some MODIS land cover data of Zambia and demonstrated annual changes and trends in the data over the last decade. Several issues were discussed such as the need to distinguish forest, woody savanna, cropland, and landscape mosaic. Possible ways forward include: 1) triangulation between MODIS and Landsat data, 2) ground truthing or stock taking to verify the trends picked up in the spatial data and to explore drivers of change with community leaders.

# Household decision module

Small group discussion around the household module focused on connections with the landscape model, causal pathways of CA and AF at the household level, and assumptions about farmer behavior. Debate about the appropriate approach to modeling included agent based modeling and community level modeling, and defining various farmer typologies and dynamic simulation scenarios that impact the landscape level. Important dynamics to capture were poaching and charcoaling livelihood strategies, migratory and landless households, scaling up AF/CA at the household level for various types of farmers. The need for in-depth modeling of soil carbon and livestock populations was downplayed. Future model iterations need to distinguish between deforestation and degradation through selective timber harvesting. There was debate around whether it is fair to say that if income rises from agriculture (through AF/CA) households would change their economic activities. Research has demonstrated that households are not expanding their farms due to agriculture profits and that in many cases charcoaling and poaching are livelihood strategies as opposed to coping strategies.

# Wildlife module

The wildlife module remains the least developed. Discussion centered around whether it was useful to model wildlife population dynamics and whether the available data are accurate enough to detect impacts from changes in poaching pressure or habitat loss. Among participants at the workshop there was consensus that it would be particularly difficult to map a plausible causal relationship from CA on wildlife species. If agroforestry, on the other hand is able to increase habitat there may be some impact on biodiversity although it remains unclear which species might benefit from this habitat. Conversations with the wildlife partners (whom were not able to attend the workshop) remain a high priority.

# Next steps

1. Spatial work will focus on triangulating available data, disaggregating land types and determining where agricultural expansion is occurring in the country and disaggregating that expansion by the different land types it is replacing.
2. The landscape module will undergo the changes mentioned above. The next step is to refine parameters based on provincial level figures.
3. Household modeling will shift to a focus on certain strategies and farm household types rather than household level decision-making. The different household types and their livelihood strategies will be translated into scenarios that will be run using the landscape model.
4. Conversations with Zambian wildlife partners will continue to explore relationships between habitat loss (deforestation) and wildlife populations.
5. Final workshop tentative dates and details are sketched out but will be explored in more detail over the next couple of months.